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represented in the Three Forks limestone. A varied but wholly Lower Carboniferous fauna has been obtained from the Madison limestone.

In chapter thirteen Mr. Stanton describes the Mesozoic fossils. These were obtained from the Gallatin range, near Electric Peak, Teton range, in the vicinity of Wildcat Peak and Huckleberry Mountain, and from the Cretaceous ridges in the southern end of the park and Yellowstone Forest Reserve. There are seventy-eight invertebrates, one of which is supposed to be of Triassic age, forty-six are Jurassic, and thirty-two are Cretaceous. The fossils are mainly from the Ellis division of the Jurassic and the Colorado of the Cretaceous.

The last chapter, by Mr. Knowlton, on the fossil flora, is a long one, covering 233 pages, besides 45 plates of illustrations. The Mesozoic flora is confined to the Laramie sandstones of the Cretaceous, and is found on Mt. Everts, near Mammoth Hot Springs, and at the base of Pinyon Peak, near the head of Wolverine Creek. The Tertiary flora is quite varied, and full of biological interest. On comparing it with the present it signifies great climatic changes since the Miocene. It is found in numerous localities associated with the breccias and silts of the igneous rocks, where the muds and silts furnished a soil favorable to plant growth. The Tertiary fossil flora embraces about 150 forms in thirty-three orders. The interesting fossil forest trees of Specimen Ridge are illustrated with photographs of the trees in the field and enlarged microscopic sections showing the cellular structure.

The petrographical and paleontological features of the Yellowstone National Park are certainly described in great detail, and the monograph will no doubt prove to be a valuable handbook to scientists, especially to those visiting the region.

T. C. H.

Report on the Geology and Natural Resources of the Area included by the Nipissing and Temiscaming Map Sheets, comprising portions of the district of Nipissing, Ontario, and of the county of Pontiac, Quebec. By ALFRED ERNEST BARLOW. Geological Survey of Canada. Part I, Annual Report. Vol X, 1899, pp. 302.

This report, accompanied by two well-executed maps on a scale of four miles to the inch, and covering an area 6912 square miles of the northern Protaxis of the Dominion of Canada, is a valuable addition to the literature of the pre-Cambrian of North America and is a further installment of the work which is being systematically carried forward by the Dominion Geological Survey on these older rocks. The two maps, constituting what are known as sheets Nos. 131 and 138 of the Canadian Series, lie in the Upper Ottawa district along the border of the two Provinces of Quebec and Ontario, and comprise portions of both. Lake Nipissing and Lakes Temagami, Temiscaming, and Keepawa, as well as many smaller bodies of water, are included in the area, and afford along their shores especially good opportunities for the prosecution of geological work.

After presenting a general account of the early explorations in this region, some of which date back almost to the time of the earliest settlement of the country by the French, and of previous surveys, the physical features of the country are described. The area is a great uneven, or gently undulating, rocky plateau, sloping somewhat to the east and southeast, having a general elevation of 900 to 1200 feet above sea level, the level being so nearly uniform that hills 50 to 100 feet higher are conspicuous topographical features. This peneplain is traversed in a north and south direction along one line by a very deep and narrow rocky gorge, in which lie Lake Temiscaming and the Ottawa River. The hills, or cliffs, rise to a height of 400 to 600 feet from the water on either side, while the water of the lake is 400 feet deep; the bottom of the gorge being filled with a fine silt. The depression is thus at least 1000 feet deep and represents a great canyon similar to those which are found on the margin of the northern Protaxis at so many other points. Several smaller rivers also occupy similar depressions. "The detailed examination of the region, however, amply demonstrates that the sculpturing to which the surface owes its present configuration was practically completed long before the advent of the glacial epoch, and that the main valleys, especially those of the Ottawa and Mattawa rivers, were in existence long prior to the deposition of the Palaeozoic sediments." With the exception of some comparatively small areas occupied by Palaeozoic outliers, ranging in age from Black River to Niagara, the district is underlain by rocks of Laurentian and Huronian age. The Laurentian, with the exception of a few small occurrences, is represented exclusively by the fundamental gneiss, a mass of granitic and dioritic rocks, usually possessing a foliated structure in which are many streaks, bands, or inclusions of basic character, allied to diorites or diabases in composition, and representing either basic segregations from the granitic magma or portions of basic intrusions caught up in it. This fundamental gneiss, it is believed, probably represents the original crust of the earth which has undergone successive fusions and re-cementations before reaching its present condition. In placing these rocks at the base of the series it is not intended to assert that they stand for any distinct or prolonged period of geological time, nor to affirm that these rocks, in their present condition and with the foliation which they now possess, antedate those of the Huronian system. This, as is shown, is not the case in many, or even probably in most, instances.

The chemical and mineralogical composition of the gneisses, as well as the character and origin of their foliation and the genetic relation of their associated pegmatites, are considered at length, and many interesting facts brought forward which cannot here be further discussed.

The Grenville series, so extensively developed further south, is in this northern area represented only by a few very small and unimportant occurrences of highly crystalline limestone and a single occurrence of gneiss. They occur isolated from one another and surrounded by fundamental gneiss on every side, and are referred to the Grenville series on account of their identity in petrographical character with the areas of this formation immediately to the south.

The district also includes large tracts of country underlain by pyroclastic and epiclastic rocks, forming a northeasterly extension of the development of the "typical" Huronian area on the north shore of Lake Huron. At one place on Lake Temiscaming, these Huronian rocks are found resting upon the floor of fundamental gneiss on which they were originally deposited, and of whose detritus they are made up, everywhere else the fundamental gneiss has been refused or softened and penetrates the superincumbent Huronian. The total thickness of the Huronian in the area is about 1800 feet, made up as follows: 1. Breccia-Conglomerate, 600 feet. 2. Shales and slaty greywackes, 100 feet. 3. Quartzose grit or Arkose, 1100 feet. Associated with these Huronian sediments are numerous intrusions of gabbro and diabase, some of which pass over gradually into flesh-red granites, representing, it is believed, portions of one and the same magma.

No attempt is made in this report to correlate the Grenville series and the Huronian of the area, as the facts are insufficient to warrant the attempt. And it may be remarked incidentally in this connection that a statement, made on page 415 of the current volume of this

JOURNAL, in reviewing some other recent papers on the Canadian pre-Cambrian, is scarcely correct. The statement is as follows :

"The succession and correlation proposed in the above papers by Adams and Barlow and by Ells are fundamentally different from the traditional one which has been held in Canada for many years. The first departure is in placing the Grenville and Hastings series as equivalent to the Huronian."

In the papers in question this correlation was not definitely made, but it was stated in reference to the Hastings series that "both lithologically and stratigraphically the rocks bear a striking resemblance to rocks mapped as Huronian in the region to the north and north-east of Lake Huron, and it seems very likely that the identity of the two series may eventually be established. The two areas, however, are rather widely separated geographically, and the greatest care will have to be exercised in attempting such a correlation."[1]

The further statement made by the reviewer that "Ells places with the Huronian all the sedimentary rocks of Eastern Canada" is also manifestly inaccurate, seeing that while it might terminate the controversy concerning the upward extension of the Huronian to include in that system the whole Palaeozoic succession, Ells cercainly did not advocate this course.

The Palaeozoic outliers in this area and especially that of Niagara age are of exceptional interest. Geographically this outlying patch of Niagara is so widely separated from any other locality where rocks of this age are now known to exist, that it has been a question as to whether it was formerly connected with the occurrences about Hudson Bay or with those about Lake Ontario. The strata are highly fossiliferous and the palaeontological evidence presented seems to prove that the seas in which the Niagara sediments of the Winnipeg basin and of Hudson Bay were deposited were practically continuous, while both were separated from the Temiscaming basin and the region to the southwest.

The Pleistocene history of the region seems to consist of a period of glaciation by a great ice-sheet, followed by a profound submergence, during which time the ocean invaded a large portion of the Ottawa valley forming a marine gulf rivaling in extent the similar invasions of the sea in Palaeozoic times. The direction of motion of the ice varies from S 7° W to S 18° W.

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[1] American Journal of Science, Vol. III, March 1897, p. 177.

The report also contains much information concerning the fauna, flora, and timber resources of the district, and has appendices giving lists of elevations and catalogues of the Palaeozoic fossils.

Frank D. Adams.

The Paleozoic Reticulate Sponges Constituting the Family Dictyospongidae. By James Hall and John M. Clarke.

More than a year ago volume one of the Fifteenth Annual Report of the New York state geologist made its appearance. In the introduction to this report several papers were announced which were not included in the volume, one of them being a monograph of the Dictyospongidae. It is this monograph which has now been published as volume two of the report above mentioned. It also appears in another binding as Memoir II of the New York State Museum. Unfortunately the annual report of the state geologist does not contain the complete monograph, the descriptions and illustrations of Carboniferous species being omitted. This monograph has long been in preparation by Drs. Hall and Clarke, and the printing of it had only been begun at the time of Dr. Hall's death.

The dictyospongidae are an extinct family of hexactinellid sponges, whose nearest living representative is the delicate glass sponge, *Euplectella*, commonly known as the "venus flower basket." They lived in greatest abundance during later Devonian and early Carboniferous time, though their most ancient representatives occur far back in the Silurian. Their fossil remains are especially abundant in the sandstones of the Chemung formation in western New York, several extensive colonies of them having been discovered as they grew upon the ancient sea bottom. Notable collections of them have also been made in the Waverly sandstones in Ohio, and in the Keokuk shale at Crawfordsville, Ind., and from the last locality only, have specimens been found in which the spicular skeleton of the sponge has been preserved.

The variety of forms assumed by these interesting sponges is wonderful, and the earlier observers were at a loss to know where to place them in the zoölogical classification. Before their sponge nature had been definitely established by Whitfield in 1881, they had been described as cephalopods and as marine plants. In life these organisms must have been most beautiful objects, "with their manifold variety of